

AUG. 26. 2008 7:40AM

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NO. 1691 P. 7

AUG 26 2008

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF:

ROGER MOONS

CASE AD6883USNA  
NO.:

APPLICATION NO.: 10/627902

GROUP ART UNIT: 1761

FILED: JULY 25, 2003

EXAMINER: DREW E. BECKER  
CONFIRMATION NO.: 3469

FOR: IMPROVED THERMOPLASTIC POLYMERIC OVENWARE

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. 1.132


1. I obtained a B.S. in Chemistry from the Polytechnic Institute of Brooklyn in 1962 and a Ph.D. in Organic Chemistry from the University of California at Davis in 1967.
2. I am currently receiving a pension from the assignee of this application E.I. DuPont de Nemours & Co., Inc. (hereinafter DuPont).
3. I am a Registered Patent Agent (No. 33,852).
4. I am currently a consultant for DuPont on technical and patent matters.
5. While consulting for DuPont I directed an experiment as set forth below.
6. A composition containing 55 weight percent of Zenite® 6000 Liquid Crystalline Polymer (available from E. I. DuPont de Nemours & Co., Inc., Wilmington, DE 19988 USA), 37 weight percent talc, and 8 weight percent carbon fiber was prepared by melt mixing in a 30 mm Werner & Pfleiderer twin screw extruder. The techniques used to prepare this composition were similar to those commonly used to prepare other compositions containing LCPs.
7. The above composition was molded in a 6 oz. HPM injection molding machine into 4 inch diameter disks.

Application No.: 10/627902  
Docket No.: AD6883USNA

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8. An above described disk (after machining) was tested for through plane thermal conductivity. The resulting value was 0.368 W/m<sup>2</sup>K.

9. The attached pages from Electronic Research Notebooks D100052 and D100008 describe this experiment and the conditions used for the various operations. The sample number for the above described composition was 13-1. The composition of sample 13-2 has been blanked out from the page, and the results for the thermal conductivity of this sample have been omitted.

  
Joel D. Citron

Date: Mar 2, 2007

T:\Patent Documents\Eng. Polymers\AD-68\AD6883\AD6883 Declaration of Joel Citron.doc



## DuPont Electronic Laboratory Notebook

Identification Number : D100052-28.01

Experiment Name : D100052-13

Program Name : Zenite

Project Name:Thermoconductivity for Joel Citron

Document Name : D100052-13 series Thermal Conductive Zenite Joel Citron.pdf

Site Name : EEP ST

Business Unit :Engineering Polymers

Author Name : Mike J. Molitor

Date : 02/26/2007 14:59:57

Co-Author Details :

Witness Name : Adcock, Dave

Date : 02/26/2007 15:03:04

|                       |   |
|-----------------------|---|
| Date (GMT)            | Signed by   |
| 2/26/2007 07:59:57 PM | Name: Mike J. Molitor<br>Pre-Sig Hash: 9b9c723fedbb8ac913753be9aa4abc415c4f0fa1   |
| Justification         | By entering your password you verify that you planned and/or executed the work, directed the work, analyzed the result, or drew the conclusions described within this document. |

|                       |   |
|-----------------------|---|
| 2/26/2007 08:03:05 PM | Name: Adcock, Dave<br>Pre-Sig Hash: 4004778267da1f14eed9d10dd217ba30817d5b91  |
| Justification         | By entering your password you will be signing to say that you have witnessed the information contained in this document |

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| Justification |               |

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E.I. du Pont de Nemours and Company

[illegible]

57 m. 2. 10. 1972.

BOOK PAGE 2 E. I. du Pont de Nemours and Company

TITLE 602 A. INJECTION COLLING DATE 10-20-52

NO 111553-36 RUN ON RURAL TESTING

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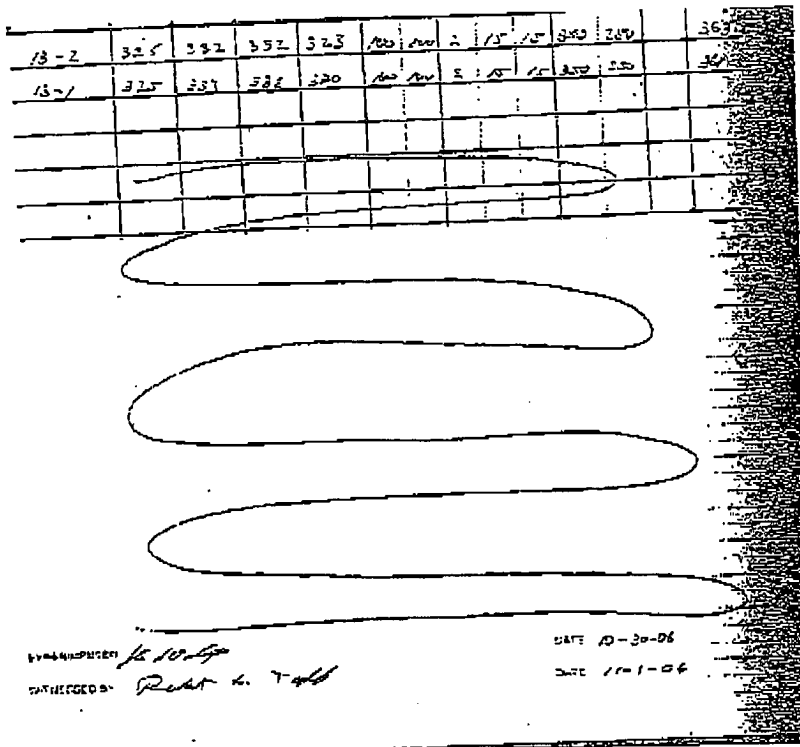
LR NO. 225 NB NO. 2 00052 DATE 10-20-52 CYLINDER 602 A  
 FOR RURAL CHARGE(S) 5.7 RAM SPEED 15.1  
 POLYMER TYPE SCALE SCREW G.A. SCREW SPEED 15.1  
 MOLD 2 100 NOZZLE 2 23 BACK PRESS. 100 100

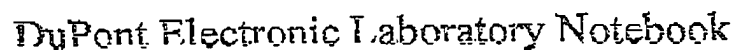
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| SAMPLE NO. | REAR | CENTER | FRONT | MOLD | DIE |     |   |    | PRESS |     | SPL |    |
|------------|------|--------|-------|------|-----|-----|---|----|-------|-----|-----|----|
|            |      |        |       |      | A   | B   | S | N  | ROST  | BU  |     |    |
| 12-9       | 32.5 | 33.2   | 33.2  | 32.3 | ADD | 100 | 2 | 15 | 15    | 350 | 230 | 35 |

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NO. 1691 P. 11





**Co-Author Details :**

Time : 02/04/2007 13:07:04

|  |               |
|--|---------------|
|  | Name:         |
|  | Pre-Sig Hash: |

**H. I. du Pont de Nemours and Company**

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NO. 1691 P. 13

TEST DESCRIPTION

MS-552-13-1

Injection molded disc

SAMPLE ID : 13-1

SAMPLE THICKNESS: 3.030mm

Average sample temperature = 50.0 C Controller= 30 C

| TU (C) | TE (C) | TL (C) | TH (C) | TU-TE (C) | Q       | RATIO    |
|--------|--------|--------|--------|-----------|---------|----------|
| 50.0   | 48.2   | 40.4   | 30.0   | 19.64     | 9472.1  | 0.211266 |
| 50.6   | 48.0   | 40.6   | 28.5   | 19.75     | 10096.7 | 0.198887 |
| 50.6   | 48.1   | 40.9   | 28.5   | 19.73     | 10107.1 | 0.198156 |

Average sample temperature = 72.0 C Controller= 35 C

| TU (C) | TE (C) | TL (C) | TH (C) | TU-TE (C) | Q       | RATIO    |
|--------|--------|--------|--------|-----------|---------|----------|
| 78.1   | 65.8   | 53.4   | 49.2   | 19.74     | 8854.4  | 0.233231 |
| 85.2   | 72.0   | 55.6   | 54.7   | 19.63     | 10161.7 | 0.193207 |
| 85.2   | 72.0   | 55.6   | 54.7   | 19.62     | 10167.3 | 0.193013 |

USING CALCULATION FILE: KSL04200-2-1  
USING TEST FILE : 13-Liter

USING FIRST ORDER FIT

SAMPLE ID : 13-1  
SAMPLE THICKNESS : 3.030mm  
CIA : 0.0004100

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF: 3.891347e-001 W/mK  
AND A THERMAL RESISTANCE OF: 8.296208e-003 m2K/W  
AT A TEMPERATURE OF: 50.75 C

0.345 W/mK

THE DELTA T THROUGH THE SAMPLE IS : 19.73 C  
THE HEATER TEMPERATURE IS : 28.54 C  
THE DELTA T ACROSS THE STACK IS : 51.10 C  
THE GUARD TEMPERATURE IS : 48.10 C

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF: 3.702624e-001 W/mK  
AND A THERMAL RESISTANCE OF: 8.126382e-003 m2K/W  
AT A TEMPERATURE OF: 72.40 C

0.370 W/mK

THE DELTA T THROUGH THE SAMPLE IS : 19.62 C  
THE HEATER TEMPERATURE IS : 54.66 C  
THE DELTA T ACROSS THE STACK IS : 30.55 C  
THE GUARD TEMPERATURE IS : 72.02 C



## DuPont Electronic Laboratory Notebook

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Identification Number : D100052-28.01

Experiment Name : D100052-13

Program Name : Zenite

Project Name:Thermoelectricity for Joel Citron

Document Name : D100052-13 series Thermal Conductive Zenite Joel Citron.pdf

Site Name : SEP ST

Business Unit :Engineering Polymers

Author Name : Mike J. Molitor

Date : 02/26/2007 14:59:57

Co-Author Details :

|                             |   |                            |
|-----------------------------|---|----------------------------|
| Witness Name : Adcock, Dave |   | Date : 02/26/2007 15:03:04 |
| Date (GMT)                  | Signed by   |                            |
| 2/26/2007 07:55:57 PM       | Name: Mike J. Molitor   |                            |
|                             | Pre-Sig Hash: 9b9c723fadbb2ec913753ba9ae4abc415c4f0fa1  |                            |
| Justification               | By entering your password you verify that you planned and/or executed the work, directed the work, analyzed the result, or drew the conclusions described within this document. |                            |
| 2/26/2007 08:03:05 PM       | Name: Adcock, Dave  |                            |
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| Justification               | By entering your password you will be signing to say that you have witnessed the information contained in this document.  |                            |
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NO. 1691 P. 15

Sample # D100052      13-1      13-2  
 Zenite 6000      55  
 Jetfil Talc 575Q      37  
 Carbon fiber Sigrasil      8

E. I. du Pont de Nemours and Company

Comp

DATE 10-20-06

TECHNICAL NAME

BARREL 1/2" SCREW

ADAPTER 1/2" SCREW

NOZZLE 1/2" SCREW

INTERLOCKING CHECKED

RUN STATUS

AUXILIARY EQUIPMENT USED

| SAMPLE NO. | REAR | CENTER | FRONT | NOZZLE | MOULD TEMP | CYCLE | PREP | TEST | SC  |
|------------|------|--------|-------|--------|------------|-------|------|------|-----|
| 13-1       | 32.5 | 33.2   | 33.2  | 33.3   | 100        | 2     | 1.5  | 1.5  | 300 |

57 mil diff.

BOOK PAGE

E. I. du Pont de Nemours and Company

1017 6 02 2 INJECTION MOLDING

DATE 10-20-06

E 111563-36

PLUGGERS

INSTRUMENT

IR NO. 432

MS NO. 2

DATE 10-20-06

CYLINDER 6 02 2

FOR 10000

CHARGE(S) 5.7

RAM SPEED 300

POLYMER TYPE 5041E

SCREW 0.0

SCREW SPEED 100

MOULD 8 1000 (R-1)

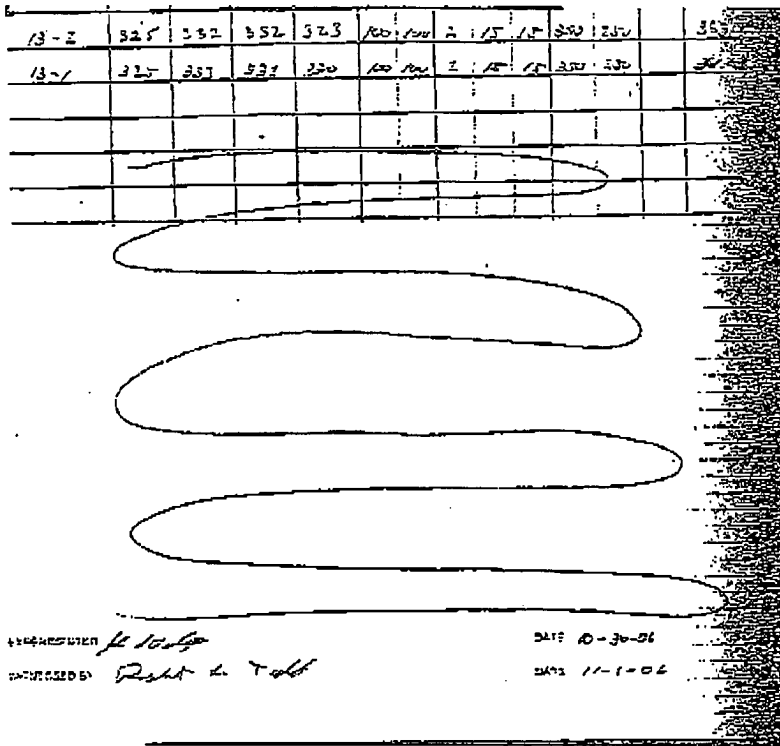
NOZZLE 2 001

BACK PRESS 100

| SAMPLE NO. | REAR | CENTER | FRONT | NOZZLE | MOULD TEMP | CYCLE | PREP | TEST | SC  |
|------------|------|--------|-------|--------|------------|-------|------|------|-----|
| 13-1       | 32.5 | 33.2   | 33.2  | 33.3   | 100        | 2     | 1.5  | 1.5  | 300 |

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AUG. 26. 2008 7:42AM

NO. 1691 P. 17



## DuPont Electronic Laboratory Notebook

Identification Number : D100052-29.01

Experiment Name : D100052-13

Program Name : Zenite

Project Name:Thermoconductivity for Joel Citron

Document Name : D100052-13 series Thermal Conductive Zenite Joel Citron2.pdf

Site Name : EEP ST

Business Unit :Engineering Polymers

Author Name : Mike J. Molitor

Date : 02/26/2007 14:59:57

Co-Author Details :

Witness Name : Adcock, Dave

Date : 02/26/2007 15:03:04

|                       |   |
|-----------------------|---|
| Date (GMT)            | Signed by   |
| 2/26/2007 07:59:57 PM | Name: Mike J. Molitor<br>Pre-Sig Hash: 9b9c723fedbb8ec913753be9ac4ab0e15c4f0fal   |
| Justification         | By entering your password you verify that you planned and/or executed the work, directed the work, analyzed the result, or drew the conclusions described within this document. |
| 2/26/2007 08:03:05 PM | Name: Adcock, Dave<br>Pre-Sig Hash: 4004778267dalf1a0ed9d10dd217ba30317d5b91  |
| Justification         | By entering your password you will be signing to say that you have witnessed the information contained in this document   |
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| Justification         |   |
|                       | Name:<br>Pre-Sig Hash:  |
| Justification         |   |

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Sample # D100052      13-1      13-2  
 Zenite 6000            55  
 Jetfill Talc 575C       37  
 Carbon fiber Sigrasil    8

Lab

E. L. du Pont de Nemours and Company

111569-36

DATE 10-20-07

CHARGE 10-20-07

SCREW 6.0

NOZZLE 6.0

CYLINDER 6.0

RAM SPEED 2.0

SCREW SPEED 2.0

BACK PRESS 2.0

| SAMPLE NO | REAR | CENTER | FRONT | NOZZLE | USED TEMP | TIME | CYCLE | PROD | WGT | WGT  |
|-----------|------|--------|-------|--------|-----------|------|-------|------|-----|------|
| 13-2      | 32.5 | 33.2   | 33.2  | 32.8   | 120       | 100  | 2     | 1.5  | 1.5 | 3.50 |

57 m. 3.5 m.

MOCK PAGE

E. L. du Pont de Nemours and Company

111569-36

DATE 10-20-07

CHARGE 10-20-07

SCREW 6.0

NOZZLE 6.0

CYLINDER 6.0

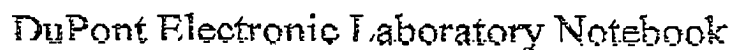
RAM SPEED 2.0

SCREW SPEED 2.0

BACK PRESS 2.0

| SAMPLE NO | REAR | CENTER | FRONT | NOZZLE | USED TEMP | TIME | CYCLE | PROD | WGT | WGT  |
|-----------|------|--------|-------|--------|-----------|------|-------|------|-----|------|
| 13-2      | 32.5 | 33.2   | 33.2  | 32.8   | 120       | 100  | 2     | 1.5  | 1.5 | 3.50 |





Co-Author Details :

Data : 02/26/2007 23:07:04

|              |               |
|--------------|---------------|
|              | Name:         |
|              | Pre-Sig Hash: |
| XXXXXXXXXXXX |               |

**B. I. du Pont de Nemours and Company**

AUG. 26. 2008 7:42AM

NO. 1691 P. 21

## TEST DESCRIPTION

312052-13-1

injection molded disc

SAMPLE ID: 312

SAMPLE THICKNESS: 3.030mm

Average sample temperature = 50.0 C Controller = 30 C

| TU (C) | TC (C) | TL (C) | TH (C) | TU-TL (C) | Q      | RATIO    |
|--------|--------|--------|--------|-----------|--------|----------|
| 50.0   | 48.2   | 40.4   | 30.0   | 19.64     | 84721  | 0.211266 |
| 50.6   | 48.0   | 40.5   | 29.5   | 19.75     | 100987 | 0.195887 |
| 50.8   | 48.1   | 40.9   | 29.5   | 19.78     | 101071 | 0.195166 |

Average sample temperature = 75.0 C Controller = 55 C

| TU (C) | TC (C) | TL (C) | TH (C) | TU-TL (C) | Q      | RATIO    |
|--------|--------|--------|--------|-----------|--------|----------|
| 75.1   | 65.9   | 55.4   | 49.2   | 19.74     | 60544  | 0.233231 |
| 85.2   | 72.0   | 55.6   | 54.7   | 19.83     | 101617 | 0.193207 |
| 85.2   | 72.0   | 55.6   | 52.7   | 19.62     | 101673 | 0.193013 |

USING CALIBRATION FILE: BSL04200.cal  
USING TEST FILE: 13-1.dat

USING FIRST ORDER FIT

SAMPLE ID: 13-1  
SAMPLE THICKNESS: 3.030mm  
CTE: 0.00024000

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF: 3.551347e-001 W/mK  
AND A THERMAL RESISTANCE OF: 2.8296209e-003 m2K/W  
AT A TEMPERATURE OF: 50.78 C

0.365 W/mK

THE DELTA T THROUGH THE SAMPLE IS: 19.73 C  
THE HEATER TEMPERATURE IS: 29.54 C  
THE DELTA T ACROSS THE STACK IS: 31.10 C  
THE GUARD TEMPERATURE IS: 48.10 C

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF: 3.7026224e-001 W/mK  
AND A THERMAL RESISTANCE OF: 2.163385e-003 m2K/W  
AT A TEMPERATURE OF: 75.49 C

0.370 W/mK

THE DELTA T THROUGH THE SAMPLE IS: 19.62 C  
THE HEATER TEMPERATURE IS: 54.68 C  
THE DELTA T ACROSS THE STACK IS: 30.58 C  
THE GUARD TEMPERATURE IS: 72.02 C

## TEST DATA

210052-13-1

Section welded disc

SAMPLE ID: 72.1  
 SAMPLE THICKNESS: 0.030mm

Average sample temperature: 30.0 C Controller: 30 C

| TU (C) | TS (C) | TL (C) | TH (C) | TD (C) | Q       | RATIO    |
|--------|--------|--------|--------|--------|---------|----------|
| 50.0   | 48.2   | 40.4   | 50.0   | 19.64  | 9472.1  | 0.21266  |
| 50.6   | 48.0   | 40.8   | 50.6   | 19.75  | 10096.7 | 0.195687 |
| 50.8   | 48.1   | 40.9   | 50.8   | 19.78  | 10107.2 | 0.195156 |

Average sample temperature: 35.0 C Controller: 35 C

| TU (C) | TS (C) | TL (C) | TH (C) | TD (C) | Q       | RATIO    |
|--------|--------|--------|--------|--------|---------|----------|
| 78.1   | 65.9   | 58.4   | 49.3   | 19.74  | 8854.3  | 0.233281 |
| 85.2   | 72.0   | 65.6   | 54.7   | 19.83  | 10161.7 | 0.193207 |
| 85.2   | 72.0   | 65.6   | 54.7   | 19.82  | 10167.3 | 0.193023 |

USING CALIBRATION FILE: RSL04200-23  
 USING TEST FILE: 13-1-1-1

USING FIRST ORDER FIT

SAMPLE ID: 13-1  
 SAMPLE THICKNESS: 0.030mm  
 CTE: 0.0000000

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF:  $3.251947e-001$  W/MK  
 AND A THERMAL RESISTANCE OF:  $3.251947e-003$  m<sup>2</sup>K/W  
 AT A TEMPERATURE OF: 30.73 C

0.345 W/mK

THE DELTA T THROUGH THE SAMPLE IS: 19.73 C  
 THE HEATER TEMPERATURE IS: 29.82 C  
 THE DELTA T ACROSS THE SPACE IS: 21.10 C  
 THE GUARD TEMPERATURE IS: 25.10 C

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF:  $3.702624e-001$  W/MK  
 AND A THERMAL RESISTANCE OF:  $3.702624e-003$  m<sup>2</sup>K/W  
 AT A TEMPERATURE OF: 72.02 C

0.370 W/mK

THE DELTA T THROUGH THE SAMPLE IS: 19.82 C  
 THE HEATER TEMPERATURE IS: 54.69 C  
 THE DELTA T ACROSS THE SPACE IS: 30.56 C  
 THE GUARD TEMPERATURE IS: 72.02 C



TEST DESCRIPTION  
 2008-12-1  
 Inspection of disc

SAMPLE ID: 13-1  
 SAMPLE THICKNESS: 3.030mm

Average sample temperature = 58.0 C Controller = 30 C

| TL (C) | TE (C) | TL (C) | TE (C) | TL (C) | Q       | RATIO    |
|--------|--------|--------|--------|--------|---------|----------|
| 50.0   | 48.2   | 48.2   | 39.5   | 19.64  | 9472.1  | 0.211256 |
| 60.6   | 48.0   | 40.8   | 28.5   | 19.75  | 10098.7 | 0.195857 |
| 60.6   | 48.1   | 40.9   | 28.5   | 19.73  | 10167.1 | 0.195186 |

Average sample temperature = 55.0 C Controller = 55 C

| TL (C) | TE (C) | TL (C) | TE (C) | TL (C) | Q       | RATIO    |
|--------|--------|--------|--------|--------|---------|----------|
| 73.1   | 55.8   | 58.4   | 49.5   | 18.74  | 8854.4  | 0.233231 |
| 65.2   | 72.0   | 65.6   | 54.7   | 18.63  | 10181.7 | 0.193207 |
| 65.2   | 72.0   | 65.6   | 54.7   | 18.62  | 10167.3 | 0.193013 |

USING CALIBRATION FILE: KSL04200.cbf  
 USING TEST FILE: 13-1.txt

USING FIRST ORDER FIT

SAMPLE ID: 13-1  
 SAMPLE THICKNESS: 3.030mm  
 CTE: 0.00021000

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF  $2.651347e-001$  W/MK  
 AND A THERMAL RESISTANCE OF  $3.773330e-003$  M<sup>2</sup>/W  
 AT A TEMPERATURE OF 58.075 C

0.345 W/mK

THE DELTA T THROUGH THE SAMPLE IS 18.73 C  
 THE HEATER TEMPERATURE IS 28.54 C  
 THE DELTA T ACROSS THE STACK IS 31.10 C  
 THE GUARD TEMPERATURE IS 48.10 C

THE SAMPLE HAS A THERMAL CONDUCTIVITY OF  $3.702624e-001$  W/MK  
 AND A THERMAL RESISTANCE OF  $2.700222e-003$  M<sup>2</sup>/W  
 AT A TEMPERATURE OF 72.02 C

0.370 W/mK

THE DELTA T THROUGH THE SAMPLE IS 18.62 C  
 THE HEATER TEMPERATURE IS 54.66 C  
 THE DELTA T ACROSS THE STACK IS 30.55 C  
 THE GUARD TEMPERATURE IS 72.02 C